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<input type="checkbox"/>	L4	L3 and ultrasonic	13
<input type="checkbox"/>	L3	photomasks and ((ammonium hydroxide) and (hydrogen peroxide) and water) and cleaning	58
<input type="checkbox"/>	L2	L1 and ((ammonium hydroxide) and (hydrogen peroxide) and water)	0
<input type="checkbox"/>	L1	((5152878) or (5695896) or (6139993)).pn.	3

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<u>L6</u>	L3 and 134/\$.ccls.	28	<u>L6</u>
<u>L5</u>	L4 and 134/\$.ccls.	10	<u>L5</u>
<u>L4</u>	L3 and ultrasonic	13	<u>L4</u>
<u>L3</u>	photomasks and ((ammonium hydroxide) and (hydrogen peroxide) and water) and cleaning	58	<u>L3</u>
<u>L2</u>	L1 and ((ammonium hydroxide) and (hydrogen peroxide) and water)	0	<u>L2</u>
<u>L1</u>	((5152878) or (5695896) or (6139993)).pn.	3	<u>L1</u>

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☐ 1. Document ID: US 6681781 B2

L4: Entry 1 of 13

File: USPT

Jan 27, 2004

US-PAT-NO: 6681781

DOCUMENT-IDENTIFIER: US 6681781 B2

TITLE: Methods for cleaning microelectronic substrates using ultradilute cleaning liquids

DATE-ISSUED: January 27, 2004

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Puri; Suraj	Los Altos	CA		
Medeiros, Jr.; Joseph	Santa Clara	CA		
Becker; David Scott	Excelsior	MN		
Narayanswami; Natraj	Eden Prairie	MN		

US-CL-CURRENT: 134/1.3; 134/1, 134/2, 134/21, 134/25.4, 134/32, 134/36, 134/42, 134/902

ABSTRACT:

A method of cleaning a surface of an article using cleaning liquids in combination with acoustic energy. Preferably, an ultradilute concentration of a cleaning enhancement substance, such as ammonia gas, is dissolved in a liquid solvent, such as filtered deionized water, to form a cleaning liquid. The cleaning liquid is caused to contact the surface to be cleaned. Acoustic energy is applied to the liquid during such contact. Optionally, the surface to be cleaned can be oxidized, e.g., by ozonated water, prior to cleaning.

12 Claims, 3 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 3

Full	Title	Citation	Front	Review	Classification	Date	Reference	Claims	KMIC	Draw D
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☐ 2. Document ID: US 6616773 B1

L4: Entry 2 of 13

File: USPT

Sep 9, 2003

US-PAT-NO: 6616773

DOCUMENT-IDENTIFIER: US 6616773 B1

TITLE: Substrate treatment method

DATE-ISSUED: September 9, 2003

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Kuzumoto; Masaki	Tokyo			JP
Noda; Seiji	Tokyo			JP
Oya; Izumi	Tokyo			JP
Miyamoto; Makoto	Tokyo			JP
Horibe; Hideo	Tokyo			JP
Kataoka; Tatsuo	Shizuoka			JP
Oishi; Tetsuji	Shizuoka			JP

US-CL-CURRENT: 134/26; 134/1.3, 134/2, 134/3, 134/31, 134/37, 216/57, 216/83,
216/94

ABSTRACT:

A substrate treatment assembly for treating a work object on a surface of a substrate by supplying to the work object a wet ozone-containing gas wetted with a treatment solution includes a substrate heating device for maintaining a substrate at a temperature higher than room temperature, a wetting device for producing a wet ozone-containing gas by wetting an ozone-containing gas with a treatment solution, a supply device for supplying the wet ozone-containing gas to a work object on a surface of the substrate, a gas conduit connecting the wetting device to the supply device, and a heating device for heating the wet ozone-containing gas to a temperature approximately equal to or greater than the temperature of the substrate.

12 Claims, 36 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 19

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	KWIC	Draw De
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☐ 3. Document ID: US 6605454 B2

L4: Entry 3 of 13

File: USPT

Aug 12, 2003

US-PAT-NO: 6605454

DOCUMENT-IDENTIFIER: US 6605454 B2

TITLE: Microfluidic devices with monolithic microwave integrated circuits

DATE-ISSUED: August 12, 2003

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
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Barenburg; Barbara Foley	Gilbert	AZ
Burdon; Jeremy	Scottsdale	AZ
Chan; Yuk-Tong	Scottsdale	AZ
Dai; Xunhu	Gilbert	AZ
Gallagher; Sean	Scottsdale	AZ
Grodzinski; Piotr	Chandler	AZ
Marrero; Robert	Chandler	AZ
Nair; Vijay	Mesa	AZ
Rhine; David	Phoenix	AZ
Smekal; Thomas	Phoenix	AZ

US-CL-CURRENT: 435/173.7; 219/690, 219/691, 219/692, 219/693, 422/22

ABSTRACT:

A microwave device has a monolithic microwave integrated circuit (MMIC) disposed therein for applying microwave radiation to a microfluidic structure, such as a chamber, defined in the device. The microwave radiation from the MMIC is useful for heating samples introduced into the microfluidic structure and for effecting lysis of cells in the samples. Microfabrication techniques allow the fabrication of MMICs that perform heating and cell lysing of samples having volumes in the microliter to picoliter range.

10 Claims, 46 Drawing figures
Exemplary Claim Number: 1
Number of Drawing Sheets: 13

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	KWC	Draw. De
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☐ 4. Document ID: US 6582525 B2

L4: Entry 4 of 13

File: USPT

Jun 24, 2003

US-PAT-NO: 6582525

DOCUMENT-IDENTIFIER: US 6582525 B2

TITLE: Methods for processing a workpiece using steam and ozone

DATE-ISSUED: June 24, 2003

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Bergman; Eric J.	Kalispell	MT	59901	

US-CL-CURRENT: 134/2; 134/19, 134/25.4, 134/26, 134/28, 134/3, 134/30, 134/31,
134/33, 134/35, 134/36, 134/37, 134/41, 134/902, 257/E21.228, 257/E21.229

ABSTRACT:

In a method for processing a workpiece to remove material from a first surface of the workpiece, steam is introduced onto the first surface under conditions so that

at least some of the steam condenses and forms a liquid boundary layer on the first surface. The condensing steam helps to maintain the first surface of the workpiece at an elevated temperature. Ozone is provided around the workpiece under conditions where the ozone diffuses through the boundary layer and reacts with the material on the first surface. The temperature of the first surface is controlled to maintain condensation of the steam.

41 Claims, 7 Drawing figures
Exemplary Claim Number: 1
Number of Drawing Sheets: 7

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	KWIC	Draw. De
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☐ 5. Document ID: US 6497768 B2

L4: Entry 5 of 13

File: USPT

Dec 24, 2002

US-PAT-NO: 6497768
DOCUMENT-IDENTIFIER: US 6497768 B2

TITLE: Process for treating a workpiece with hydrofluoric acid and ozone

DATE-ISSUED: December 24, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Bergman; Eric J.	Kalispell	MT		

US-CL-CURRENT: 134/3; 134/2, 134/25.4, 134/30, 134/31, 134/33, 134/41, 134/902,
257/E21.228, 257/E21.229

ABSTRACT:

A workpiece or substrate is placed in a support in a reaction chamber. A heated process liquid is sprayed onto the substrate. The thickness of the layer of process liquid formed on the substrate is controlled, e.g., by spinning the substrate. Ozone is introduced into the reaction chamber by injection into the liquid or into the reaction chamber, while the temperature of the substrate is controlled, to chemically process the substrate. The substrate is then rinsed and dried.

28 Claims, 7 Drawing figures
Exemplary Claim Number: 1
Number of Drawing Sheets: 7

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	KWIC	Draw. De
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☐ 6. Document ID: US 6045621 A

L4: Entry 6 of 13

File: USPT

Apr 4, 2000

US-PAT-NO: 6045621

DOCUMENT-IDENTIFIER: US 6045621 A

TITLE: Method for cleaning objects using a fluid charge

DATE-ISSUED: April 4, 2000

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Puri; Suraj	Los Altos	CA		
Mohindra; Raj	Los Altos Hills	CA		

US-CL-CURRENT: 134/2; 134/10, 134/11, 134/25.4, 134/25.5, 134/26, 134/30, 134/34,
134/36, 134/902, 134/95.1, 134/95.2

ABSTRACT:

A method for cleaning an object. The method (400) includes immersing (420) an object in a liquid comprising water, which can be ultra-clean. The object has a front face, a back face, and an edge. The method includes providing (450) a cleaning enhancement substance (e.g., trace amount of polar organic compound, surfactant, ammonia bearing compound) into the liquid. In one embodiment, the cleaning enhancement substance can form a liquid film, such as a monolayer overlying an upper surface or level of the liquid. The method also includes providing a substantially particle free environment (e.g., ultra-clean gas, ultra-clean non-reactive gas) adjacent to the front face and the back face of the object as the liquid including the cleaning enhancement substance is being removed.

18 Claims, 13 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 9

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	KWIC	Draw. De
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☐ 7. Document ID: US 5653045 A

L4: Entry 7 of 13

File: USPT

Aug 5, 1997

US-PAT-NO: 5653045

DOCUMENT-IDENTIFIER: US 5653045 A

**** See image for Certificate of Correction ****

TITLE: Method and apparatus for drying parts and microelectronic components using sonic created mist

DATE-ISSUED: August 5, 1997

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Ferrell; Gary W.	Half Moon Bay	CA	94019	

US-CL-CURRENT: 34/341; 257/E21.228, 34/352

ABSTRACT:

An apparatus and method for drying single or multiple parts or objects wherein the apparatus uses a drying chamber for containing said object or objects, said drying chamber having a closeable entryway for providing access to said drying chamber, the use of a sonic head disposed in said drying chamber attached to a source of drying liquid and an adjustable supply and drain attached to said drying chamber for introducing and removing said drying fluid to and from said drying chamber.

12 Claims, 16 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 9

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	KMC	Draw. De
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☐ 8. Document ID: US 5555902 A

L4: Entry 8 of 13

File: USPT

Sep 17, 1996

US-PAT-NO: 5555902

DOCUMENT-IDENTIFIER: US 5555902 A

TITLE: Submicron particle removal using liquid nitrogen

DATE-ISSUED: September 17, 1996

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Menon; Venugopal B.	Austin	TX		

US-CL-CURRENT: 134/199; 134/105, 134/902

ABSTRACT:

Liquid nitrogen is introduced onto a surface of a semiconductor wafer to remove submicron particles from its surface. LN.sub.2 flows across the wafer surface wherein the surface tension of the liquid collects contaminant particles and removes them off the edge of the wafer.

8 Claims, 7 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 2

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	KMC	Draw. De
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☐ 9. Document ID: US 5505785 A

L4: Entry 9 of 13

File: USPT

Apr 9, 1996

US-PAT-NO: 5505785

DOCUMENT-IDENTIFIER: US 5505785 A

TITLE: Method and apparatus for cleaning integrated circuit wafers

DATE-ISSUED: April 9, 1996

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Ferrell; Gary W.	Half Moon Bay	CA	94019	

US-CL-CURRENT: 134/1; 134/201, 257/E21.228

ABSTRACT:

A method and apparatus for removing particle, metallic and organic contamination from the wafers used in fabricating integrated circuits is disclosed. In the preferred embodiment, the method comprises the step of placing the wafers to be processed in a vessel or container constructed of a very pure metal, and upon which a surface oxide will quickly form in air. The metal vessel or container is then filled with a cleaning solvent such as sulfuric acid, and are ultrasonically vibrated to remove the contamination. The ultrasonic vibration causes an acoustic streaming of the sulfuric acid, leading to a microflow of the solvent across the surface of the wafer at speeds on the order of several meters per second. This microflow provides for an quick and efficient cleaning of the wafer at reduced temperatures, thereby increasing the overall throughput of the planar fabrication process. The apparatus comprises a vessel or container constructed from a very pure metal, and containing an acidic cleaning solvent. The metal vessel or container is coupled to an ultrasonic vibrating device which ultrasonically vibrates the vessel or container, thereby cleaning the wafers.

21 Claims, 16 Drawing figures

Exemplary Claim Number: 12

Number of Drawing Sheets: 6

Full	Title	Citation	Front	Review	Classification	Date	Reference	Claims	KWIC	Draw D
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☐ 10. Document ID: US 5456758 A

L4: Entry 10 of 13

File: USPT

Oct 10, 1995

US-PAT-NO: 5456758

DOCUMENT-IDENTIFIER: US 5456758 A

**** See image for Certificate of Correction ****

TITLE: Submicron particle removal using liquid nitrogen

DATE-ISSUED: October 10, 1995

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Menon; Venugopal B.	Austin	TX		

US-CL-CURRENT: 134/33; 134/31, 134/34, 134/902

ABSTRACT:

Liquid nitrogen is introduced onto a surface of a semiconductor wafer to remove submicron particles from its surface. LN.sub.2 flows across the wafer surface wherein the surface tension of the liquid collects contaminant particles and removes them off the edge of the wafer.

11 Claims, 7 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 2

Full	Title	Citation	Front	Review	Classification	Date	Reference	Claims	KWC	Draw. D
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Term	Documents
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☐ 11. Document ID: US 4654116 A

L4: Entry 11 of 13

File: USPT

Mar 31, 1987

US-PAT-NO: 4654116

DOCUMENT-IDENTIFIER: US 4654116 A

TITLE: Method for producing high resolution etched circuit patterns from clad laminates

DATE-ISSUED: March 31, 1987

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Spacer; Edward T.	Harleysville	PA		

US-CL-CURRENT: 216/13; 205/125, 205/215, 252/79.2, 430/314, 438/652, 438/694

ABSTRACT:

A method for producing high resolution etched circuit patterns from a metal clad laminate of a conductive species on a nonconductive substrate is provided. The laminate is etched with an etchant solution for the conductive species to form a circuit pattern. The etched laminate is contacted with an oxidizing agent and aqueous acid to remove redeposited conductive species from the exposed substrate adjacent the circuit pattern. The side walls of the resulting circuit pattern are substantially vertical and free of "halo".

18 Claims, 4 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 1

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	KWIC	Draw. De
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☐ 12. Document ID: US 4339340 A

L4: Entry 12 of 13

File: USPT

Jul 13, 1982

US-PAT-NO: 4339340

DOCUMENT-IDENTIFIER: US 4339340 A

TITLE: Surface-treating agent adapted for intermediate products of a semiconductor

device

DATE-ISSUED: July 13, 1982

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Muraoka; Hisashi	Yokohama			JP
Asano; Masafumi	Yokosuka			JP
Ohashi; Taizo	Kanagawa			JP
Shimazaki; Yuzo	Tokyo			JP

US-CL-CURRENT: 252/79.5; 134/34, 216/83, 216/99, 257/E21.228, 510/175, 510/421,
510/504, 510/505, 510/506

ABSTRACT:

A surface-treating agent formed of an aqueous solution containing 0.01 to 20% by weight of trialkyl(hydroxyalkyl) ammonium hydroxide. The treating agent is adapted to be used for the effective removal of organic and inorganic contaminants deposited on the surface of intermediate semiconductor products obtained in the respective steps of manufacturing a semiconductor device and the efficient etching of a metal layer used as wiring. Further, it can be used for the elimination of those portions of a positive working photoresist film coated on the surface of the intermediate semiconductor products which are and are not exposed to a light by controlling its concentration.

34 Claims, 7 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 3

Full	Title	Citation	Front	Review	Classification	Date	Reference	Claims	KWIC	Draw De
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☐ 13. Document ID: US 4239661 A

L4: Entry 13 of 13

File: USPT

Dec 16, 1980

US-PAT-NO: 4239661

DOCUMENT-IDENTIFIER: US 4239661 A

TITLE: Surface-treating agent adapted for intermediate products of a semiconductor device

DATE-ISSUED: December 16, 1980

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Muraoka; Hisashi	Yokohama			JP
Asano; Masafumi	Yokosuka			JP
Ohashi; Taizo	Kanagawa			JP
Shimazaki; Yuzo	Tokyo			JP

US-CL-CURRENT: 438/471; 134/2, 134/38, 134/42, 257/E21.228, 430/326, 430/331,
438/329, 438/745, 438/754, 510/175, 510/372, 510/373, 510/421, 510/434, 510/504

ABSTRACT:

A surface-treating agent formed of an aqueous solution containing 0.01 to 20% by weight of trialkyl(hydroxyalkyl) ammonium hydroxide. The treating agent is adapted to be used for the effective removal of organic and inorganic contaminants deposited on the surface of intermediate semiconductor products obtained in the respective steps of manufacturing a semiconductor device and the efficient etching of a metal layer used as wiring. Further, it can be used for the elimination of those portions of a positive working photoresist film coated on the surface of the intermediate semiconductor products which are and are not exposed to a light by controlling its concentration.

32 Claims, 7 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 3

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	KWIC	Draw De
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